thorough, and, as Clerk Maxwell said in these columns in 1877 (vol. xv. p. 389), the thoroughness was that which of itself demands the mastery of many sciences, and in doing so makes its mark on each. He solved problems with which great mathematicians, since the time of Euler, had occupied themselves in vain. Questions as to vortex motion and the discontinuity of motion in liquids, and the vibrations of sound at the open ends of organ pipes, belong to this class of subjects elucidated by him. In his numerous papers on thermodynamics, he reduced to an intelligible and systematic form the labours and intricate investigations of several independent theorists, so as to compare them with each other and with experiment. Other subjects investigated by him are electrodynamics, stereoscopic vision, galvanic polarisation, the theory of anomalous dispersion, the origin and meaning of geometrical axioms, the mechanical conditions governing the movements of the atmosphere, the production of waves, &c. But even the circle of natural and physical sciences does not embrace all the subjects which he benefited by his keen insight and strenuous energy. He was an acute logician and an accomplished metaphysician. His investigations on perception and observation of the senses led him to study the theory of cognition. The principal conclusion he came to after an examination of the subject, was that the impressions of the senses are only signs for the constitution of the external world, the interpretation of which must be learned by experience.

In 1891, when Helmholtz reached his seventieth birthday, the event was made the occasion of an international celebration. In honour of the anniversary, a marble bust was prepared, and numerous marks of respect were bestowed upon him by his admirers, both in and out of his own country. The German Emperor raised him to the highest rank in the Civil Service; the Kings of Sweden and of Italy, the Grand Duke of Baden, and the President of the French Republic conferred Grand Crosses upon him; many academies, not only of science, but also of the fine arts, faculties, and learned societies representing all parts of the world, sent him diplomas and richly illuminated addresses, expressing their recognition of his scientific labours, and their thanks for his work. His native town, Potsdam, conferred its freedom upon him, and countless individuals sent their congratulations. It was on the occasion of this jubilee that Helmholtz delivered the autobiographical sketch published in the second volume of his "Scientific Lectures," and which has furnished us with some of the particulars contained in the foregoing. He was made a Foreign Member of the Royal Society in 1860, and received the Copley Medal in 1873. He was also one of the Associés Etrangers of the Paris Academy of Sciences, and a correspondent of most important scientific academies and societies all over the world.

Science has had few investigators who have furthered her interests more than Helmholtz. He was constantly exploring new fields of research, or bringing his keen intellect to bear upon old ones. With his contributions he helped to raise science to a higher level. And, while he did as much as anyone to render scientific discoveries understandable to the whole intellectual world, he always recognised that he was in the service of something that should be held everlastingly sacred, a feeling which kept him from playing to the gallery either in his popular works or in his lectures. Many years ago, it was written—

"A wise man instructeth his people, and the fruits of his understanding fail not."

"A wise man shall inherit glory among his people, and his name shall be perpetual."

To no one could these words be more appropriately applied than to the eminent investigator whose loss we now deplore.

NOTES.

We note with deep regret that Prof. H. K. Brugsch, the distinguished philologist and Egyptologist, died on Sunday last, at the age of sixty-seven.

The Deputy-Mastership of the Mint, vacated by the resignation of Sir C. Fremantle, K.C.B., will be filled at once by the appointment of a distinguished official, Mr. Horace Seymour, Deputy-Chairman of the Board of Customs. If the post had been destined for a scientific man, it would doubtless have been given to Prof. Roberts-Austen, C.B., but his acceptance of it would have involved his resignation of his chair at the Royal College of Science. The due discharge of the duties of the Deputy-Mastership would, moreover, have left him far less opportunity for research than he has in his present office at the Mint, which he has made such an important one for science. Sir Charles Fremantle has always encouraged original research in his Department, and we wish him much happiness in his well-earned retirement.

The death of the Comte de Paris recalls the fact that he was a Fellow of the Royal Society. He was elected by ballot on April 27, 1865, and signed the charter book on May 18 of the same year. Under the statutes which were then in force, any foreign sovereign prince or the son of a sovereign prince could be proposed for immediate ballot if he wished to enter the Society. In the case of the Comte de Paris it was found that, according to the strict letter of the statutes, the head and representative of a Royal house might be inadmissible by privileged election, whilst members of the same family of inferior rank were entitled to it. Although he was the hereditary representative of the then late King of the French, yet inasmuch as his father had not been a "sovereign prince," the Society was precluded from extending the courtesy of election, and therefore took steps to amend the statute, and upon being advised that Court usage would accord, introduced words establishing the privilege to "any foreign prince who is received by her Majesty as Imperial Highness, or Royal Highness." It was under such an amended statute that the unanimous election of the Comte de Paris occurred.

The death of Prof. Josiah Parsons Cooke, LL.D., which took place in Boston, Massachusetts, on Tuesday, is, says the *Times*, not simply a loss to Harvard University, where he has laboured for more than forty-four years, but to the scientific world at large. His work on "The New Chemistry" is well known and highly esteemed, and has been translated into nearly every language of Europe. Born in 1827, he graduated from Harvard in 1848. In the following year he became tutor in mathematics, afterwards instructor in chemistry, and in 1850 Erving Professor of Chemistry and Mineralogy at Harvard. Under his direction the course in chemistry was greatly developed. He was the first in America to introduce laboratory instruction into the undergraduate course. In addition to his duties at Harvard, it was his practice to give courses of popular lectures on chemistry in the cities of Baltimore, Brooklyn, Washington, Lowell, and Worcester, besides his regular lectures at the Lowell Institute in Boston. As director of the chemical laboratory at Harvard he has published numerous contributions to chemical science, most of which have been collected and published in a volume entitled "Chemical and Physical Researches." In 1872 he was elected an honorary Fellow of the Chemical Society, sharing that distinction with only one other American; and in 1882 he was granted the degree of LL.D. by Cambridge University.

The death is announced of Sir Edward Augustus Inglefield, K.C.B., F.R.S., at the age of seventy-four. The following particulars as to his scientific work are extracted from an obituary notice in the *Times*:—After seeing a large amount of active service, and earning for himself a high reputation, he was appointed to the command of the yacht *Isabel* in a private expedition which was sent in search of Sir John Franklin to Smith's and Jones's Sound—an experience which partly suggested the interesting story he published under the title of "A Summer Search for Sir John Franklin." Although it failed in its main object, his plucky mission on that occasion enabled him to record the discovery of an open polar sea and a coastline 800 miles in length, while he also had the pleasure of carrying mails to the Government Arctic Expedition at Beechey Island. For these services he received the gold medal of the Royal Geographical Society of London, the large silver medal of Paris, and a much-treasured diamond snuff-box from the Emperor of the French. He was at the same time elected a Fellow of the Royal Society. His first Arctic experience brought him a second like command in 1853, when he went out by order of the Admiralty with three ships, especially despatched to the relief of Sir Edward Belcher's expedition. One of the three vessels was crushed in the ice, and foundered, but he was able to bring home an officer bearing the news of the discovery of the North-West passage. In the following year he received the command of another expedition, consisting of the *Phœnix*, the *Talbot*, and a transport with stores, sent out to afford further relief to Sir Edward Belcher, and this time he brought back the officers and crews of five ships which were abandoned in the ice. For these services he was awarded the Arctic medal, and the honour was signally confirmed by the Queen in 1887, when he was knighted on the occasion of the celebration of the completion of the fiftieth year of her Majesty's reign. To his skill and daring as a seaman Sir Edward Inglefield added a technical ingenuity which has bequeathed to naval engineering the hydraulic steering apparatus fitted in the *Achilles* and the *Minotaur*, the screw-turning engine of the *Monarch*, and the anchor bearing his name, which was supplied to the *Dreadnought*, *Sans Pareil*, *Renown*, *Inflexible*, and other ships. He was a graceful writer and a vigorous speaker, and, beside the book recounting his Arctic researches, was the author of pamphlets on "Maritime Warfare," "Naval Tactics," and "Terrestrial Magnetism."

THE thirty-ninth exhibition of the Royal Photographic Society will open to the public on Monday, September 24. The exhibition will be held, as on former occasions, in the Gallery of the Royal Society of Painters in Water Colours, at 5A Pall Mall East, and will remain open until November 14.

THE Royal Commission appointed last year to inquire into the mode of identification of habitual criminals having reported favourably on the Bertillon system, the Commissioners of Prisons have decided to adopt the anthropometrical system of measurement of criminals. The system will be worked in connection with the present system of identification. From various prisons officers have been already ordered to attend at her Majesty's Prison, Pentonville, to receive instructions from Dr. Garson.

REUTER reports that the members of the Arctic excursion party, organised by Dr. Cook, and noted in NATURE of August 30 (p. 429), have returned to North Sydney, Cape Breton, in the Gloucester fishing schooner *Rigel*. The steamer *Miranda*, by which the party travelled, grounded and sprang a leak on the coast of Greenland. After they had remained on the disabled vessel for some time, the party were taken off by the *Rigel*. The *Miranda* was floated and taken in tow, but foundered on her way home.

A MONUMENT, erected in honour of Armand de Quatrefages, was unveiled at Vallerangue, his native town, at the end of last month. M. Darboux presided over the distinguished company that took part in the ceremony. The scientific labours of the renowned investigator were extolled by MM. Milne-Edwards, Hamy, Geoffroy Saint Hilaire, and Brongniart. Prof. Hamy referred to Quatrefages as the creator of the science of anthropology. The monument is five metres in height, and consists of a bronze bust of the deceased on a stone pedestal, having on its principal face a figure holding in one hand a scientific work, while the other is presenting a crown to the eminent naturalist.

WE learn from the New York *Nation* that the Marine Biological Laboratory at Wood's Holl, Mass., has concluded its seventh summer session, the most successsful in its history. The number of students and investigators in attendance was 153, representing seventy colleges and high schools. Courses of instruction in zoology and botany were offered, a new building for the accommodation of the students in the latter course having been erected. The important part played by the Laboratory in the development of the biological sciences in this country is evidenced by the fact that no less than fifty-eight of those in attendance were carrying on research in zoology, botany, or physiology, and that several important investigations were completed during the summer. A number of the lectures delivered at the Laboratory during the session will as in former years, be published in book form.

MR. H. GARNETT informs us that while boating with a friend on the River Avon, just above Evesham, on August 11, he had a good view of a white swallow flying amongst a flock of others very near the ground. Its companions were apparently persecuting it. Finally it flew across the river close over the observers' heads, and this view was sufficient to convince them that it was the common swallow, and not one of the martins. Curiously, it was not a snow-white, but apparently a very pale uniform cream colour. In connection with Mr. Garnett's observation, it is worth remark that the current number of *Science Gossip* contains a note on a white variety of the common sparrow, shot at Ripley on August 13; and Mr. E. W. Atkinson, writing to the *Zoologist*, says that he recently saw a white swallow at Harswell, in the East Riding of Yorkshire.

OF all the sciences, meteorology is probably the farthest from perfection. Many dabble in it, but few seriously attempt to reduce the abundance of observations to law and order. One of the reasons for this state of things is that, so far as we can remember, none of our educational institutions include systematic courses of meteorology in their curricula. There is practically no field for professional meteorologists, and therefore no training-school exists. For the sake of the science we are glad to note, however, that the Board of Regents of the University of California has decided to establish a course in meteorology in that University. Through the course of study and investigation which the students of meteorology will prosecute at the University, valuable additions to knowledge may be expected.

M. DE FONVIELLE calls our attention to one of Roger Bacon's essays, published in 1618, in which some of the possibilities of steam are vaguely foreshadowed, and aërial navigation is declared to be a thing of the future. We quote from a translation with which he has furnished us, and which reads like Mother Shipton's prophecies. "Instruments may be made for navigating without any men pulling the oars, with a single man governing, and going quicker than if they were full of pulling men. Waggons also can be made so that without any horse they should be moved with such a velocity that it is impossible to measure it. . . . It is possible also to devise instruments for flying, such that a man being in the centre if revolving something by which artificial wings are made to beat the air in the fashion of the birds. . . . It is also possible to devise instruments which will permit persons to walk on the bottom of the sea. . . . All these things have been done in old times and in our times, except the instrument for flying, which I have not seen, and I have not known any man who saw it done."

The portion of Lord Salisbury's address which refers to the periodic law was not delivered in exactly the same form that it was printed in the official copy. A correspondent of the *Chemical News* points out that in the printed report (see NATURE, August 9, p. 340) the following passage occurs:—"In the last few years the same enigma has been approached from another point of view by Prof. Mendeléeff. The periodic law which he has discovered reflects on him all the honour that can be earned by ingenious, laborious, and successful research." Before the address was delivered, Lord Salisbury became aware of the claim of Newlands as the first discoverer of the periodic law, and the words actually spoken in the Sheldonian Theatre were:—"In the last few years the same enigma has been approached from another point of view by our own countryman Newlands and by Prof. Mendeléeff. The periodic law which they have discovered, &c." Unfortunately, the address was already printed and distributed to the press before the alteration was made. The claim of Mr. Newlands is secured to him by the award of the Davy Medal in 1887 by the Council of the Royal Society.

Writing from Table Cape, Tasmania, Mr. H. S. Dove says that a fine aurora was witnessed there early on the morning of July 21, from about 12.30 until a few minutes after 1. The whole of the western, southern, and a good deal of the eastern heavens was illuminated by a strong red glow, paling to a delicate pink at the edges. The glow was brightest about half-way between the horizon and zenith, but was discernible over the whole space between those two boundaries, and when it paled and faded in the west would spread and become very vivid towards the east. The broad vertical white stripes which usually accompany these auroræ were also noticeable, but the most uncommon feature of the phenomenon was the presence of brilliant white flashes which shot upwards in rapid succession, spreading out into a fan-shape as they rose, and instantly disappearing. These were principally seen about the Southern Cross, where the vertical stripes were also brightest, the region about that constellation appearing to be the centre of a great electrical disturbance. A low bank of clouds lay along the horizon under the aurora, and a stream of white fleecy clouds sailed up from about west-north-west, but preserved almost a straight line on the edge next the phenomenon, as if something in the highly electrical state of the atmosphere there prevented their spreading in that direction. A note concerning the same aurora appeared in our issue of August 30.

A new department of the Pasteur Institute in Paris has recently been established, having for its special object the experimental study of means of defence against destructive insects. The new section—Station expérimentale de l'Institut Pasteur—as it is called, has (says the *Revue Scientifique*) been placed under the superintendence of M. Metchnikoff, with M. J. Danysz as assistant. The department will be concerned with the following points: (1) The collection and cultivation of all the pathogenic microbes of insects and animals destructive to crops; (2) the study of the conditions of development of these microbes in animals and on various media; (3) the direction of field-experiments; (4) the superintendence and control of practical applications of the results of laboratory work. The best means of applying these results will be discussed by a *Comité d'études* consisting of naturalists, agriculturists, and some specialists in mycology, bacteriology, and agriculture, such as MM. Brocchi, Costantin, Grandeau, Millardet, Sauvageot, Schribeaux, A. Giard, J. Künckel d'Herculis, A. Laboulbène, P. Marchal, and E. L. Ragonot, of the Société entomologique of France. A *Bulletin* will be published, containing notes and communications to the station and the committee, and the proceedings of meetings. It is also proposed to give monographs of destructive insects and pathogenic microbes; statistics concerning the damage done by harmful animals; and critical notes on all publications referring to these matters. In connection with the Laboratoire de Parasitologie of the Bourse de Commerce and the entomological station of Paris, the new section of the Pasteur Institute will render excellent service to French agriculture.

We have received from the *Deutsche Seewarte* its report for the year 1893; it is issued as an appendix to the *Annalen der Hydrographie*, from which useful publication we have frequently had occasion to quote. The report shows that much good work is being done, but to which we can now only briefly refer. In the department of maritime meterology, great activity is shown in the collection and utilisation of observations made on board ships of both services, the number of co-operators during the year amounting to 430 for the mercantile marine alone. The results are published in tables for one-degree squares of the North Atlantic, in the daily synoptic charts issued in connection with the Danish Meteorological Institute, and in the preparation of atlases for different oceans, the one now in hand being for the Pacific. Similar activity is also shown in the department for weather prediction, and the daily weather reports issued by it are among the most complete that are published; they contain full particulars of the weather twice or thrice daily, at about 100 stations all over Europe, in addition to the usual weather charts and summary of existing conditions.

In a paper read before the Asiatic Society of Bengal, Dr. R. Havelock Charles calls attention to the incomparability of nasal indices derived from measurements of the living head with those deduced from observation of dry skulls. The author carefully measured the nasal diameters of sixty-two "subjects," of various castes, and then having removed the integuments, &c., and cleared the naso frontal suture and anterior nasal aperture, he again measured the diameters. The results are certainly somewhat startling. The height of the nose taken on the undissected head is almost invariably less than the long diameter of the nose measured on the skull of the same head, the difference amounting, in one case, to as much as 16 mm. The higher the caste the greater the discrepancy, but it may be reckoned to be upon an average about 4 mm. in the higher races. The transverse diameter of the anterior nasal aperture, taken on the skull, is less than the breadth of the nose taken on the head of the same subject. The difference is usually 7 mm., and in the lower castes it may be as much as 9 mm. or even 11 mm. Also, other things being equal, the older the individual the greater is the difference between these measurements. Hence, we see that the nasal index deduced from observations on the skull must always be lower than the index calculated from measurements taken upon the head; and, therefore, the *skull* nasal index will place a race upon a higher platform than the *head* nasal index.

The *Rendiconti del Reale Istituto Lombardo* contain a paper by Profs. Bartoli and Stracciati on the effect of a thin veil of cloud or mist upon the intensity of solar radiation. This effect was brought out in a striking manner by choosing from among some thousand pyrheliometer observations made at Catania and at Casa del Bosco, on Etna (4725 feet above sea-level), those which corresponded to the same altitude of the sun and to approximately the same hygrometric state of the atmosphere. It was found that a stratum of cirrus clouds interposed in the path of the sun's rays was capable of intercepting up to 30 per cent. of the radiant energy. When the sky was of a light blue colour, but quite cloudless, the absorption was greater than in the case of a deep azure sky. The ratio of the amounts of heat transmitted ranged from 77 per cent. with an altitude of 10° above the horizon, to 96 per cent. at 50°. The effect of a slight mist equally distributed in every direction was somewhat undefined, since the ratio of the absorptions does not appear to vary regularly with the thickness of the stratum of air. In one pair of cases, with the sun at 45° 15′, the quantity of heat received during one second by 1 square cm. of the pyrheliometer surface was 0·0237 with a deep blue sky, and 0·0201 with a slight mist. With the sun at 9° 42′ the figures were 0·0161 and 0·0093 respectively. In general, the ratio varied between 58 and 92 per cent.

AT the Adelaide meeting of the Australasian Association for the Advancement of Science, the committee appointed to collect evidence as to glacial action in Australasia, in Tertiary or post-Tertiary time, presented their report. The conclusions arrived at are as follows:—At the time of their greatest extension the ancient glaciers of New Zealand were larger and descended lower the further they were south. The terminal moraines in North-West Nelson go to 2700 feet above the present sea-level; Lake Rotoiti, in South Nelson, to 2000 feet; Lake Sumner, probably a glacier lake, is 1700 feet above the sea. In South Canterbury the terminal moraines are 1000 feet, and in South Otago only 600 feet above the present sea-level. In Westland and in the West Coast Sounds the glaciers advanced to below the present sea-level. The glacier of Boulder River was four, and that of Lake Rotoiti about twelve miles in length; the glacier at the head of the Waiau-ua or Dillon, fourteen miles; that of the Rakaia, fifty-five miles; the Wanaka glacier, sixty; that of Wakatipu, eighty; and that of Te Anau, sixty-five miles in length. There is, therefore, a considerable difference in relative proportion between the ancient glaciers and their present representatives. At present they reach their maximum in South Canterbury, and get smaller both to the north and to the south; while in ancient times their maximum was in Central Otago. The committee had little biological evidence to report upon, but what there is indicates that the ocean round New Zealand has not been much colder than at present ever since the Miocene period.

THE Glasgow and West of Scotland Technical College has issued its Calendar for the session 1894-95. Another Calendar just received refers to the Mining School at Houghton, Michigan, and contains information concerning the institution and its courses of instruction.

THE current number of the *Quarterly Journal of the Royal Meteorological Society* contains a portrait of Luke Howard, the author of the system of cloud nomenclature in general use, together with a biographical notice of him. The papers in the *Journal* include one by Mr. W. H. Dines, on the duration and lateral extent of gusts of wind, and the measurement of their intensity; and another, by the same author, on the relation between the mean quarterly temperature and the death-rate. The calculation of photographic cloud measurements is described by Dr. G. K. Olsson, and Mr. Inwards' address on phenomena of the upper air, delivered before the Society in April last, is printed in full.

A CALENDAR of the Evening Classes to be held at the People's Palace, Mile End Road, during the Session 1894-95, has been sent to us. Under the direction of Mr. J. L. S. Hatton, the number of these classes has been largely increased. In addition to the usual scientific and technological subjects, instruction is offered in astronomy, brass-work, bookbinding, instrument making, differential and integral calculus, determinants, trilinear co-ordinates and advanced co-ordinate geometry of three dimensions, and practical physics. The Drapers' Company have voted the sum of £5000 for the erection of new engineering workshops, and several new laboratories have been constructed. More than 8000 class-tickets were issued last session, and there is every prospect of this number being increased during the coming one.

To the current number of *Science Progress*, Prof. W. Halliburton, F.R.S., contributes a paper in which he emphasises the importance of further study of blood coagulation and the poisonous proteids secreted by snakes. Mr. A. C. Seward shows that algæ have a much greater claim to the attention of geologists as possible agents of rock construction than has generally been admitted. Fossil algæ is also the subject of a paper by Mr. George Murray. Dr. George A. Buckmaster describes the biological characters of *Bacillus typhosus* (Eberth) and *Bacterium coli commune* (Escherich). In a paper on ancient volcanic rocks, Mr. Alfred Harker compares the views of continental petrologists, who hold that there is a fundamental distinction between the "older" (that is, pre-Tertiary) volcanic rocks and the "younger" (Tertiary and Recent), with the conviction of English students, that the supposed differences are due to the fact that the former are, as a rule, more affected than the latter by the changes which come with lapse of time. Mr. E. H. Griffiths writes on the measurement of temperature, and shows that mercury thermometers are hardly comparable in point of accuracy with the platinum thermometer.

AN account of the striking changes which the great lava lake in Kilauea has undergone this year, appears in the *Hawaiian Gazette* for July 24, a copy of which the Hon. Rollo Russell has sent us. The lava steadily rose after the last great breakdown of the floor of the crater in March 1891, when an area of 2500 feet long, by 2000 feet wide, fell more than five hundred feet in one night. Towards the end of last year, the rising and overflowing of the lake filled the pit thus produced. Since that time the activity of the lake has been intense, as many as twenty-three overflows of liquid lava having taken place in a single day, and the walls surrounding the lake have been rapidly raised by continual overflows. Accurate measurements of the lake were made by Mr. F. E. Dodge, of the Survey Department, in August 1892 and March 1894. From his observations it appears that in August 1892 the outer rim surrounding the lake was 282 feet below the level of the Volcano House. The surface of the lake was 240 feet below this line. In March, 1894, the surface of the lake was 207 feet above this line, making a rise of 447 feet in nineteen months. But the most interesting observations relate to the breaking down of the lake, witnessed by a number of persons in July last. On July 11 the lava began to sink steadily, falling at the rate of about twenty feet an hour. This subsidence caused the banks to give way. We quote from the *Gazette*:—"From about noon until eight in the evening there was scarcely a moment when the crash of the falling banks was not going on. As the level of the lake sank, the greater and greater height of the banks caused a constantly increasing commotion in the lake as the banks struck the surface of the molten lava in their fall. A number of times a section of the bank from 200 to 500 feet long, 150 to 200 feet high, and 20 to 30 feet thick, would split off from the adjoining rocks, and with a tremendous roar, amid a blinding cloud of steam and dust, fall with an appalling down-plunge into the boiling lake, causing great waves to dash into the air, and a mighty 'ground swell' to sweep across the lake, dashing against the opposite cliffs like storm waves upon a lee shore. Most of the falling rocks were immediately swallowed up by the lake, but when one of the great downfalls referred to occurred, it would not immediately sink, but would float off across the lake, a great floating island of rock. At about three o'clock an is land of this character was formed estimated to be about 125 feet long, 25 feet wide, and rising 10 to 15 feet above the surface of the lake. Shortly after, another great fall took place, the rock plunging out of sight beneath the lava. Within a few moments, however, a portion of it, approximately 30 feet in diameter, rose up to an elevation of from 5 to 10 feet above the surface of the lake, the molten lava streaming from its surface, quickly cooling, and looking like a great rose-coloured robe, changing to black. These two islands, in the course of an hour, floated out to the centre, and then to the opposite bank. At eight in the evening they had changed their appearance but slightly, but the next morning they had disappeared." It was observed that, as the falls occurred, the exposed surface, sometimes more than 100 feet across, was left red-hot. Sometimes a great mass would fall forward like a wall; at others it would simply collapse and slide down, and again enormous boulders, as big as a house, singly and in groups, would break from their fastenings, and, all aglow, leap far out into the lake. It is believed that this is the first break-down of Kilauea that has taken place in the presence of observers, those prior to 1868 being before the establishment of the Volcano House, and those of 1868, 1886, and 1891, and several minor ones, all having occurred at night when no one was present.

THE additions to the Zoological Society's Gardens during the past week include a Slender Loris (*Loris gracilis*) from Ceylon, presented by Miss Grace Thomson; two Wild Swine (*Sus* sp.?) from Turkish Arabia, presented by Mr. F. G. Beville, H.B.M. Consul; three Agoutis (*Dasyprocta* sp.?) and two Orange-winged Amazons (*Chrysotis amazonica*) from the Island of Tobago, presented by the Hon. W. Low; a Raven (*Corvus corax*), European, presented by Mr. Ogilvie Grant; a Green Turtle (*Chelone viridis*) from the West Indies, presented by Mr. E. Leach; a Japanese Teal (*Querquedula formosa*) from North-eastern Asia, purchased; a collection of Marine Fishes, purchased; two Shamas (*Cittocincla macrura*) from India, received in exchange; a Brazilian Blue Grosbeak (*Guiraca cyanea*), and a Red-headed Marsh Bird (*Angelæus ruficapillus*) from Brazil, received in exchange; and a Diana Monkey (*Cercopithecus diana*) from West Africa, deposited.

OUR ASTRONOMICAL COLUMN.

THE HARVEST MOON.—This year's Harvest Moon will be exceptionally conspicuous. On the day of full moon, September 14, the ascending node of our satellite's orbit will be only 1° 35′ from the vernal equinox. The inclination of the orbit to the horizon will therefore be very nearly the same as if the node were exactly at the equinox. Owing to this, the moon is longer above the horizon than she is at other times of the year. On the average, the moon rises fifty-one minutes later every night; but for a few evenings before and after the coming full moon, the average interval is only about ten minutes.

ECLIPSE OF THE MOON.—A partial eclipse of the moon, partly visible at Greenwich, will occur early on Saturday morning. The first contact with the penumbra takes place at two o'clock in the morning, the first contact with the shadow at 3h. 36m., and the middle of the eclipse happens at 4h. 32m. The last contact with the shadow will occur at 5h. 27m. As the moon sets shortly after, the last contact with the penumbra will not be observable. Taking the moon's apparent diameter as equal to 1, the magnitude of the eclipse = 0·225.

M. TISSERAND ON SATELLITE-ORBITS.—M. Tisserand's recent investigations on the satellite of Neptune have already been referred to in these columns (vol. xlix. p. 543). He has shown that the equatorial protuberance of Neptune causes the direction of the major axis of the orbit of the satellite to change, and that the reaction of the satellite itself modifies the position of the plane of the planet's equator. As the mass of the satellite is comparatively small, the latter effect can be neglected for a considerable period of time. But when the difference of mass between a primary and its companion is not great, the case is altered. In the *Bulletin Astronomique* for August, M. Tisserand investigates the various conditions affecting the secular displacements of the equator of a planet and the satellite-orbit. He cites the Algol system as a case in which the two members—that is, the luminous star and the dark companion revolving round it—have comparable masses. The distance separating the pair is also commensurate with their dimensions. Under these conditions, the variations of the equator. and those of the orbit of the satellite, can be treated at the same time. The secular inequalities undergone by the equator and the orbit doubtless cause the proportion of the bright star's disc eclipsed by the dark companion to vary with the lapse of ages. A secular change in the range of variability must result from this. Observations extending over a long interval of time should also show changes in the periods of variables like Algol. M. Tisserand considers cases of this kind and develops the formulæ relating to them. The discussion of the formulæ is reserved for a future communication.

THE DISTRIBUTION OF NEBULÆ AND STAR-CLUSTERS.—Mr. Sidney Waters has mapped the positions of the nebulæ and star-clusters—7840, in all—contained in the New General Catalogue, and two excellent lithographed charts, given in the number of *Monthly Notices*, R.A.S., just issued (vol. liv. No. 8), show the results of his labours. The Milky Way is drawn upon the charts, the portion for the northern heavens being taken from Dr. Boeddicker's fine maps, while that in the southern heavens is copied from the *Uranometria Argentina*. Mr. Waters designed the maps with two objects. First, to study the distribution of nebulæ and clusters of stars, and, secondly, to guide astronomers engaged upon the observation of nebulæ to fields of research. Clusters are shown upon the charts by means of red crosses, resolvable nebulæ by red dots, and irresolvable ones by black dots. The distribution of these objects is thus taken in at a glance. Whether, in the light of recent research, it was desirable to continue to recognise this difference between nebulæ is a matter of opinion; one point in favour of the distinction is that it was followed in similar maps drawn by Mr. Waters and laid before the Royal Astronomical Society in 1873, so that the two sets are easily comparable. The present charts show very clearly the peculiarities of the distribution of clusters and nebulæ. Referring to the former, Mr. Waters says: "It is striking to note the fidelity with which they follow not only the main track of the Milky Way but also its convolutions and streams. They appear in many parts to seek out the denser regions, and to avoid with an equal persistence the dark spaces." As to nebulæ, we read (and the maps bear out the remarks): "A proportionate scattering of resolvable nebulæ follow the others throughout the charts, showing that they are probably intermixed, and that the resolvability of many of them must not necessarily be regarded as a criterion of their distance. The remarkable avoidance of the nebulæ of the galaxy, although in some points reaching up to and encroaching upon its edges, is equally significant with the coincidence of the clusters with its main track." It is pointed out that the exceeding nearness to one another of very many of the nebulæ suggests the probability of physical connection analogous to that of double stars, hence long-continued observations may lead to the detection of similar orbital motions. Other fields of research are suggested by the charts, and by exploring them new light will certainly be thrown upon the structure of the sidereal universe.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

A GENERAL account of the recent meeting of the American Association for the Advancement of Science was contributed to our last issue by Dr. W. H. Hale. We are now able to give a few extracts from presidential addresses, together with descriptions of some of the papers read before the different sections.

In the course of his reply to the address of welcome to